VSE CORPORATION

Strategy for Achieving Enterprise Excellence

Presented to

General Paul J. Kern

CG, Army Materiel Command

Quality Management System

January 12, 2004

Voice of the Customer

Lean Six Sigma

VSE Corporation

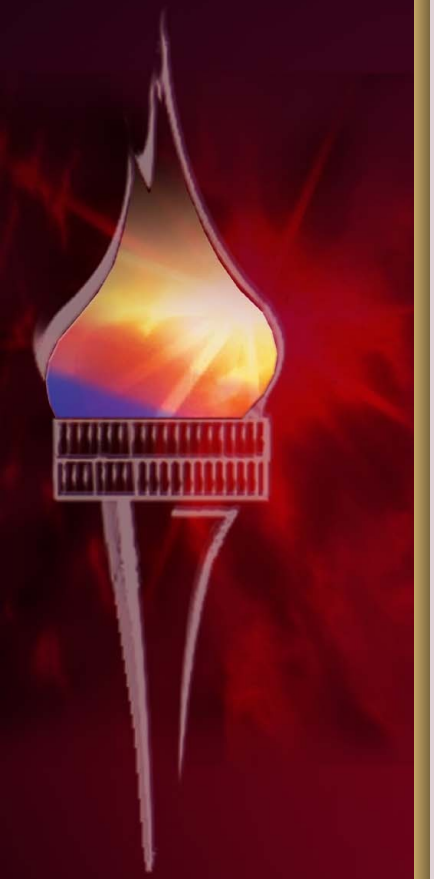
VSE Corporation is an ISO 9001-2000 registered engineering and services company with 45 years of experience supporting Army, Navy and Department of Energy programs.

- **Design → Prototyping → Testing**
- **Service Life Extension**
- **Technology Insertion**
- **Logistics Systems**
- **Obsolescence Management**
- **Quality and Reliability Programs**

Depth, Breadth and Diversity

Management Sciences Division

We help commercial and government organizations achieve Enterprise Excellence by providing program implementation workshops, consulting, and the tools for process and product improvement.



Workshops

Consulting

Implementation

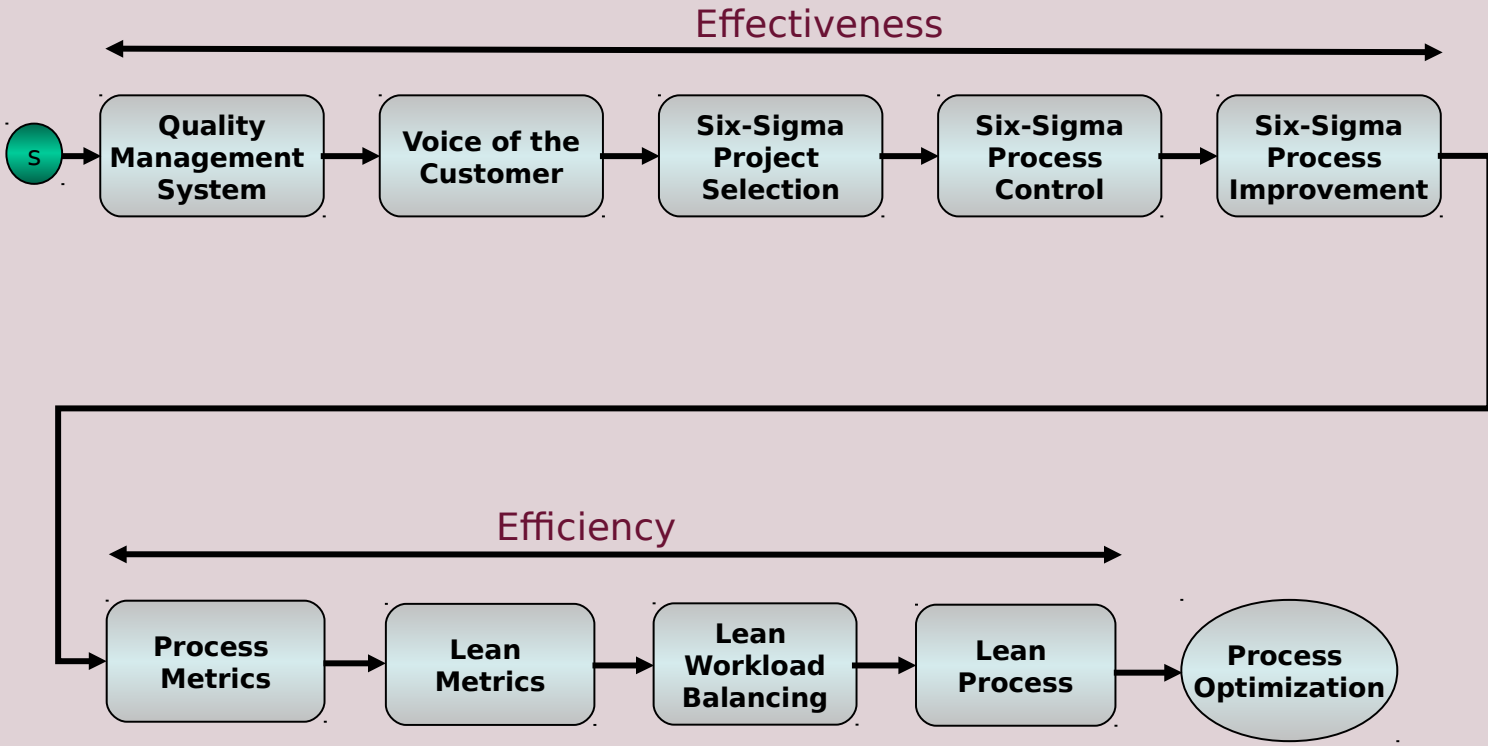
911 Calls

- **Lean Six Sigma**
- **Transactional Lean Six Sigma**
- **Design For Six Sigma (DFSS)**
- **Project Management**
- **Reliability Engineering**
- **Statistics**

Breadth and Depth of Knowledge and Experience

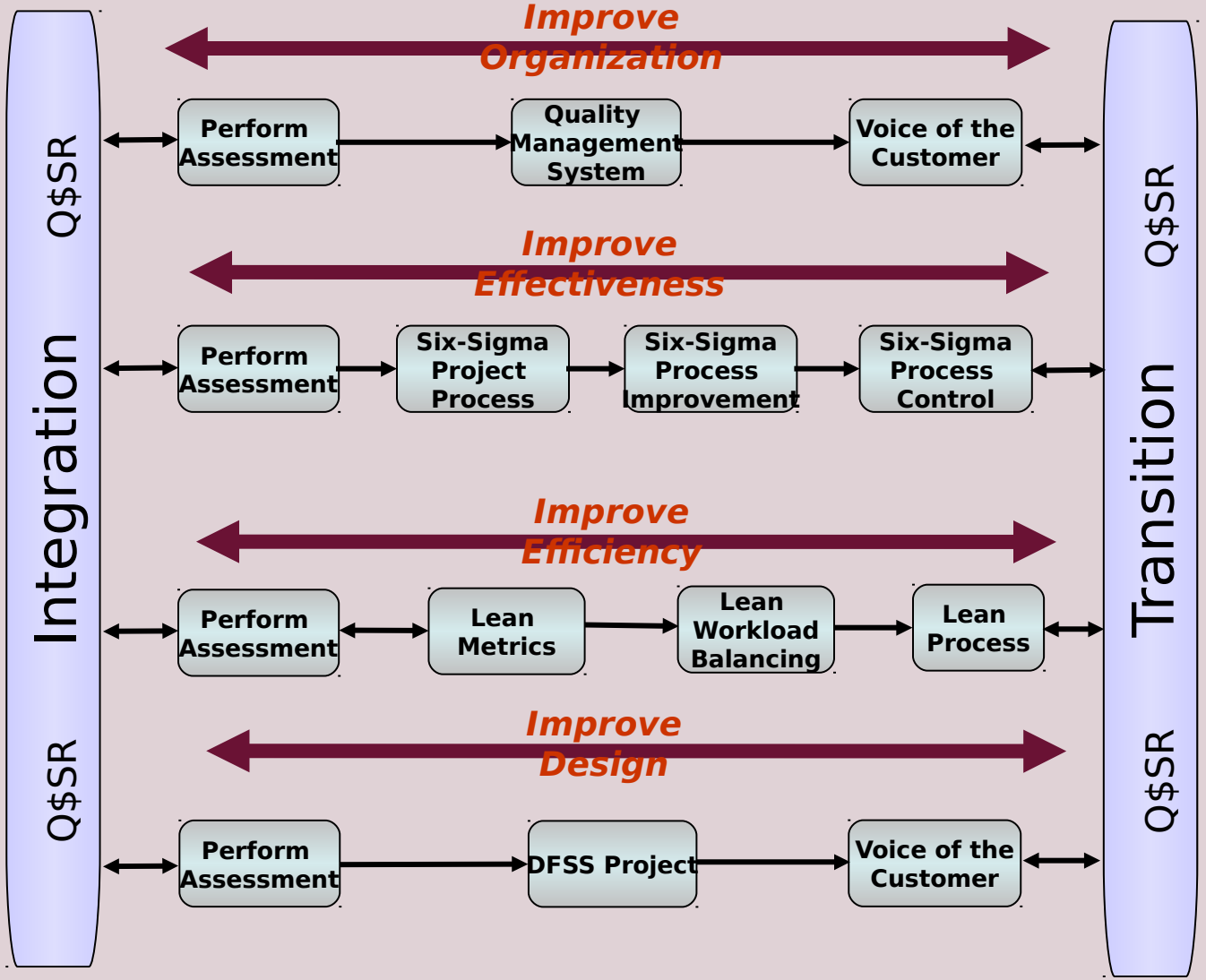
Enterprise Excellence

The Integration of Lean and Six Sigma is the basis for Enterprise Excellence.



Integrated - Structured – Disciplined - Accountable

Integrated


Improve Organization
Perform Assessment
Quality Management System
Voice of the Customer
Improve Effectiveness
Perform Assessment
Six-Sigma Project Process
Six-Sigma Process Improvement
Six-Sigma Process Control
Improve Efficiency
Perform Assessment
Lean Metrics
Lean Workload Balancing
Lean Process
Improve Design
Perform Assessment
DFSS Project
Voice of the Customer
Q$SR
Integration
Q$SR
Q$SR
Transition
Q$SR

Structured

This structure provides consistency in program implementation

Disciplined

The disciplined Lean Six Sigma Processes:

- Executive Review Panels
- Scheduled periodic executive reviews
- Organizational Infrastructure

The Lean Six Sigma Infrastructure brings discipline to program implementation

Accountable

An integrated Lean Six Sigma program provides:

- Lean Six Sigma Certification
- Quality, Cost, Schedule and Risk
- Focus on the enterprise bottom line
- Measurable results

Enterprise Excellence never mistakes effort for RESULTS

Lean Six Sigma Infrastructure

E² ESC – Steering Committee/Executive Panel

L/6σ Champions

L/6σ Black Belts

L/6σ Green Belts

L/6σ Team Member's

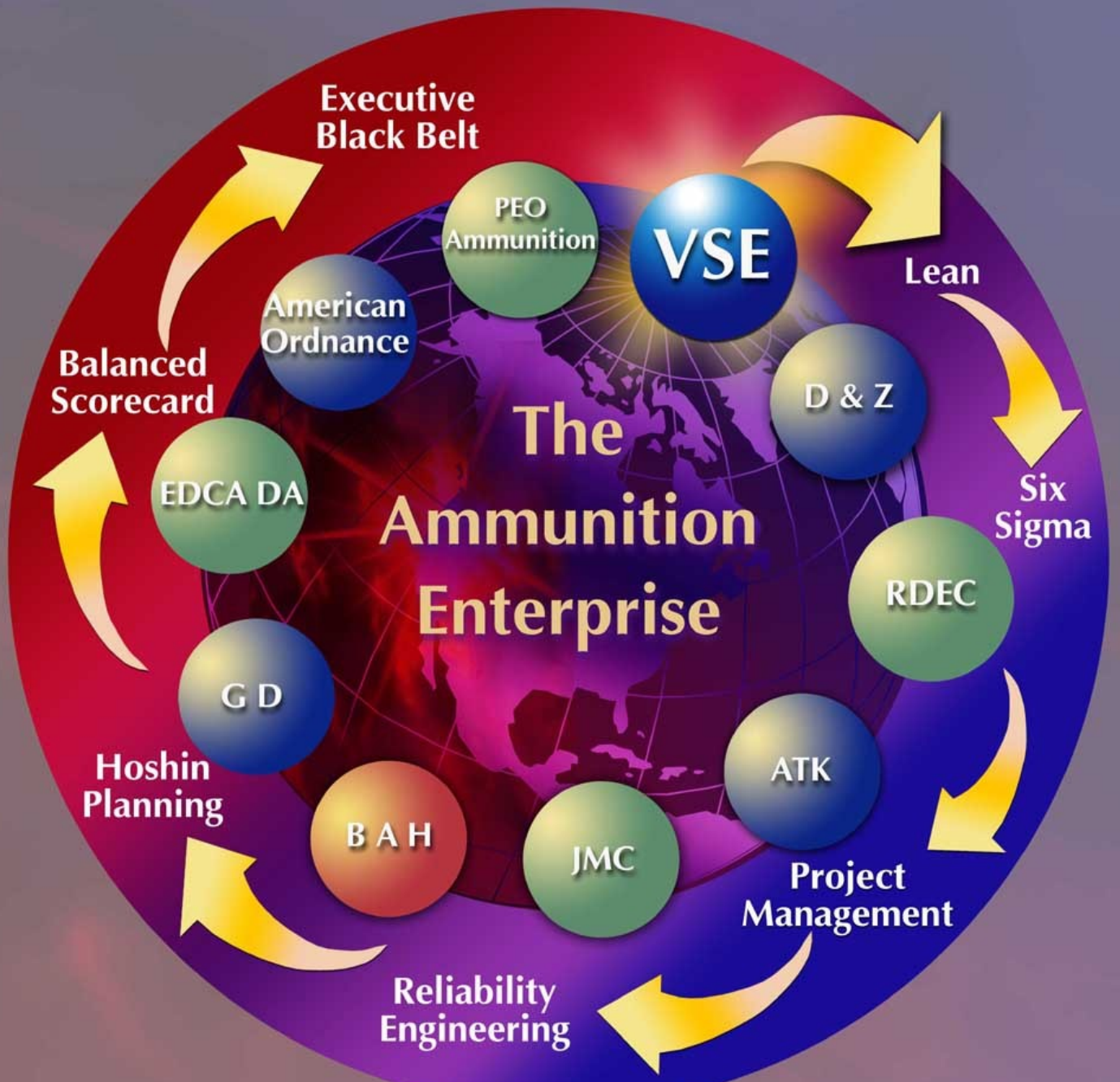
Management Commitment and Direct Involvement Drives Cultural Change

VSE Enterprise Excellence

VSE has designed, developed and implemented Lean Six Sigma Programs at the following Army and commercial activities:

- **PEO Ammunition**
- **RD&E Command (ARDEC)**
- **TACOM**
- **JMC**
- **Army Suppliers**
  - ✓ **General Dynamics**
  - ✓ **Alliant Technologies (ATK)**
  - ✓ **American Ordnance**
  - ✓ **Many other Army suppliers have attended our Lean Six Sigma, Project Management, Reliability and Statistical workshops.**

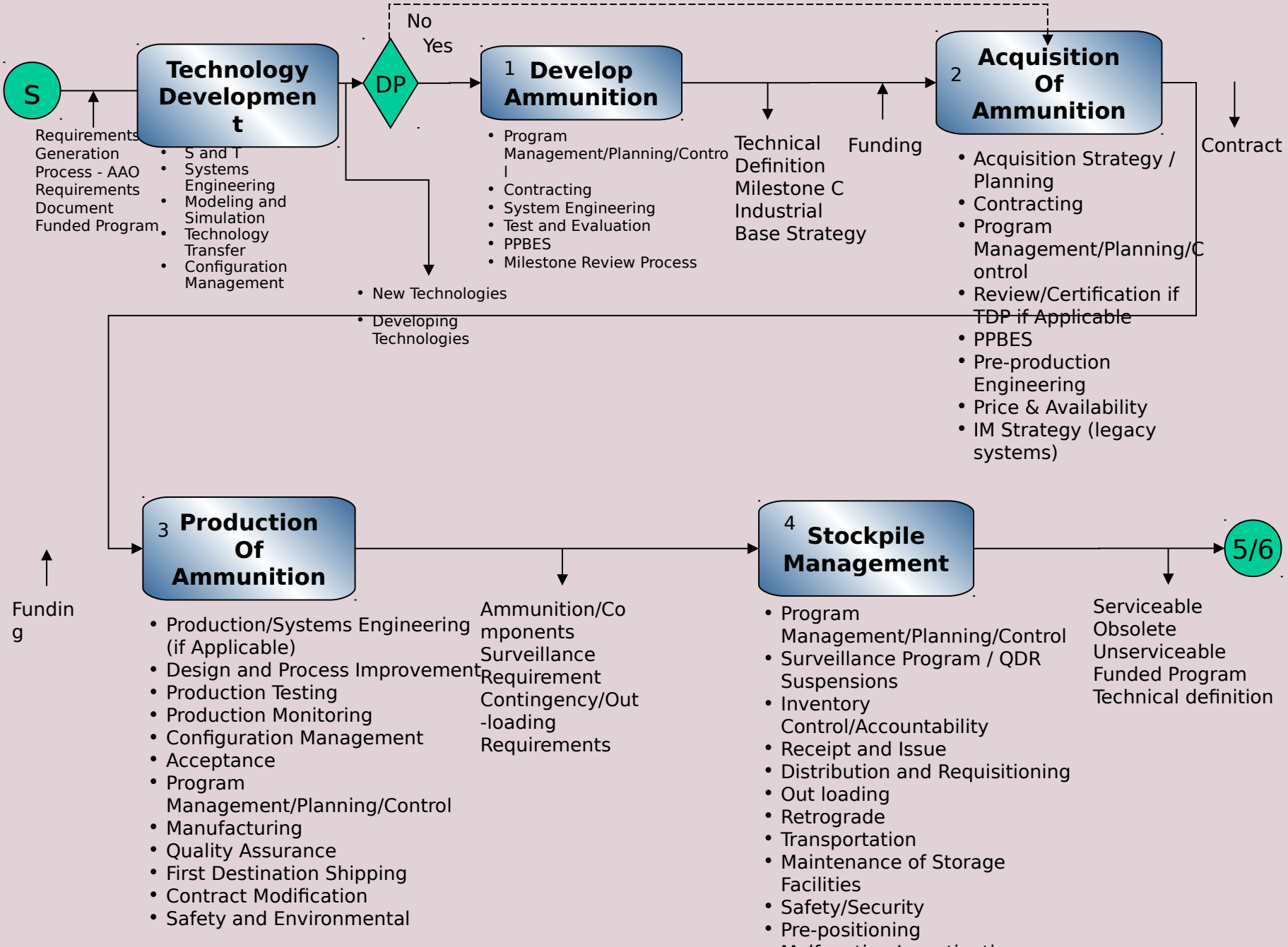
VSE CORPORATION



Integrated, Structured, Disciplined, Accountable

Ammunition Enterprise Definition

Requirements	Functions	Processes
• Ammunition/Components • Storage Facilities • Funding • Surveillance Requirement • Contingency/Out-loading Requirements	**Stockpile Management**	• Program Management/Planning/Control • Surveillance Program / QDR Suspensions • Inventory Control/Accountability • Receipt and Issue • Distribution and Requisitioning • Out loading • Retrograde • Transportation • Maintenance of Storage Facilities • Safety/Security • Pre-positioning • Management Control • Malfunction Investigation • PPBES
• Maintenance Requirement / Unserviceable • Funded • Technical Definition	**Maintenance of Stockpile**	• Program Management/Planning/Contro • Maintenance Planning • Parts Procurement • Contracting • Acceptance • Safety security environmental • Execute Program • Management Control
• Obsolete • Unserviceable • Funded Program • Technical definition	**Demilitarization Of Ammunition**	• Program Management/Planning/Control • Commercial Sale • Develop Demil Technologies and Procedures • R^3 • Contracting • FMS • Disposal • Recode to Stock


S
Requirements Generation Process - AAO Requirements Document Funded Program
Technology Development
S and T
Systems Engineering
Modeling and Simulation
Technology Transfer
Configuration Management
DP
No
Yes
New Technologies
Developing Technologies
1 Develop Ammunition
Program Management/Planning/Control
Contracting
System Engineering
Test and Evaluation
PPBES
Milestone Review Process
Technical Definition Milestone C Industrial Base Strategy
Funding
2 Acquisition Of Ammunition
Acquisition Strategy / Planning
Contracting
Program Management/Planning/Control
Review/Certification if TDP if Applicable
PPBES
Pre-production Engineering
Price & Availability
IM Strategy (legacy systems)
Contract
Funding
3 Production Of Ammunition
Production/Systems Engineering (if Applicable)
Design and Process Improvement
Production Testing
Production Monitoring
Configuration Management
Acceptance
Program Management/Planning/Control
Manufacturing
Quality Assurance
First Destination Shipping
Contract Modification
Safety and Environmental
Ammunition/Components Surveillance Requirement Contingency/Out-loading Requirements
4 Stockpile Management
Program Management/Planning/Control
Surveillance Program / QDR Suspensions
Inventory Control/Accountability
Receipt and Issue
Distribution and Requisitioning
Out loading
Retrograde
Transportation
Maintenance of Storage Facilities
Safety/Security
Pre-positioning
Serviceable
Obsolete
Unserviceable
Funded Program
Technical definition
5/6

Ammunition Enterprise Process Owners

Ammunition Enterprise Mission The Ammunition Enterprise is the integration of people, infra-structure and processes required for ammunition life cycle	Technology Development 0	S and T prioritization Pri 16 -level 1	Develop Ammunition-level 0	System Engineering Pri 14 -level 1	Acquisition of Ammunition-level 0	Acquisition Strategy / Planning -level 1 Pri 1	Procurement level 2 Pri 3	Production of Ammunition-level 0	Production/Systems Engineering (if Applicable) -level 1 Pri 4	Design and Process Improvement -level 1 Pri 2	Production Monitoring pri 12 -level 2	Control of Manufacturing Process - level 1 Pri 9	Quality Assurance -level 1 Pri 6	Sockpile Management-level 0	Surveillance Program / QDR Suspensions Pro 11 -level 1	Inventory Control/Accountability Pri 17 -level 1	Distribution and Requisitioning Pri 18 -level	Maintenance of Stockpile-level 0	Demilitization of Ammunition-Level 0	Develop Demil Technologies and Procedures Pri 15 -level 1	Management controls-Level 0	Management metrics -level 1 Pri 10	IT -level 1 Pri 7	Industrial Base Management-Level 0	Production Based Support Program -level 1 Pri 13	Industrial Base Strategic Plan -level 1 Pri 8	Production Modernization -level 1 Pri 5
Requirements																											
Delivery of Ammo	▪		▪		▪			▪						▪				▪			▪			▪			
On time delivery					▪			▪						▪							▪						
Within cost	▪		▪		▪			▪										▪						▪			
Cost effective	▪		▪		▪			▪						▪													
Safe	▪		▪		▪			▪																			
Reliable	▪		▪		▪			▪						▪				▪	▪								
High Quality	▪		▪		▪			▪						▪				▪									
Continuous Improvement	▪		▪		▪			▪						▪				▪									
Readiness	▪		▪		▪			▪						▪				▪			▪			▪			
Disposal	▪		▪																▪								
Overmatch	▪		▪											▪													
Assignments Within Enterprise																											
PEO-Ammunition	**S**	**S**	**O**	**O**	**O**	**O**		**O**	**O**	**O**		**O**	**O**	**S**	**S**	**S**	**S**	**S**	**O**	**S**	**O**	**PO**	**PO**	**PO**	**O**	**O**	**PO**
PM-CAS	**S**	**S**	**S**	**S**	**S**	**S**	**O**	**S**	**S**	**S**	**O**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
PM-MAS	**S**	**S**	**S**	**S**	**S**	**S**	**O**	**S**	**S**	**S**	**O**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
PM CCS	**S**	**S**	**S**	**S**	**S**	**S**	**O**	**S**	**S**	**S**	**O**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
PM-JS	**S**	**S**	**S**	**S**	**S**	**S**	**O**	**S**	**S**	**S**	**O**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**O**	**S**	**S**	**S**		**S**	**S**	**S**
JMC	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**O**	**O**	**O**	**O**	**O**	**S**	**S**	**O**	**PO**	**PO**	**PO**	**S**	**S**	**PO**
ARDEC	**O**	**O**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**		**S**	**S**	**S**	**O**	**PO**	**PO**	**S**	**S**	**S**	**S**
TACOM							**S**																		**S**		
External to Enterprise																											
DA Staff			**O**		**O**			**S**						**S**				**S**	**S**								
OSD Staff			**O-ACAT 1**		**O-ACAT 1**			**S**						**S**				**S**	**S**								
EDCA																											
External Support Activities																											

Recent L/6σ Successes

Artillery Ammunition Digital X-Ray Equipment

- **Integrated Contractor & Government's Approval Processes**
- **6 Months Reduced to 4 Months (Savings: $120K)**

M734A1 Mortar Fuze Production Yield

- **Analysis identified Design Deficiency**
- **Re-design Reduced Scrap from 5.0% to 0.1% (Savings: $50K/month)**

Insensitive Munitions Waiver Process

- **Streamlined PEO-Ammunition's Approval Process**
- **2+ year cycle Reduced to 7 Months**

120mm Mortar Fin Malfunction Investigation

- **Developed Corrective Actions to Release Suspended Mortar Ammunition (Stockpile worth $200M)**
- **Reduced Risk in Future Procurements**

Lean Cycle Time Reduction

Six Sigma Design for Six Sigma Scrap and Cost

Lean Cycle Time Reduction

Six Sigma Cost Avoidance and Risk Reduction

Recent L/6σ Successes

ATK Ball Seal
- Implemented Effective Screening Process
- AQL Failures reduced from 50% to 0%.
- Project Savings $155K, Cost $31K, Net $124K

ATK Battery Hermetic Seal
- Implemented Redesigned Fixture w/Poka Yoke
- Eliminated Weld Rework
- Project Savings $178K, Cost $85K, Net $93K

Six Sigma Scrap Rate Reduction

GDOTS Adhesive Application
- Implemented Automatic Adhesive Metering process.
- Reduced Reject Rate from 4.1% to 0.1%
- Projected Savings Weekly $1.2K, Cost $500, Net $756.

Six Sigma Design for Six Sigma Scrap and Cost

GDOTS Propellant Loading Cycle Time
- Implemented improved fixtures, testing and procedures,
- Reduced Propellant Loading Cycle Time to 5 minutes
- Projected Savings $85K, Cost $5K, Net $80K

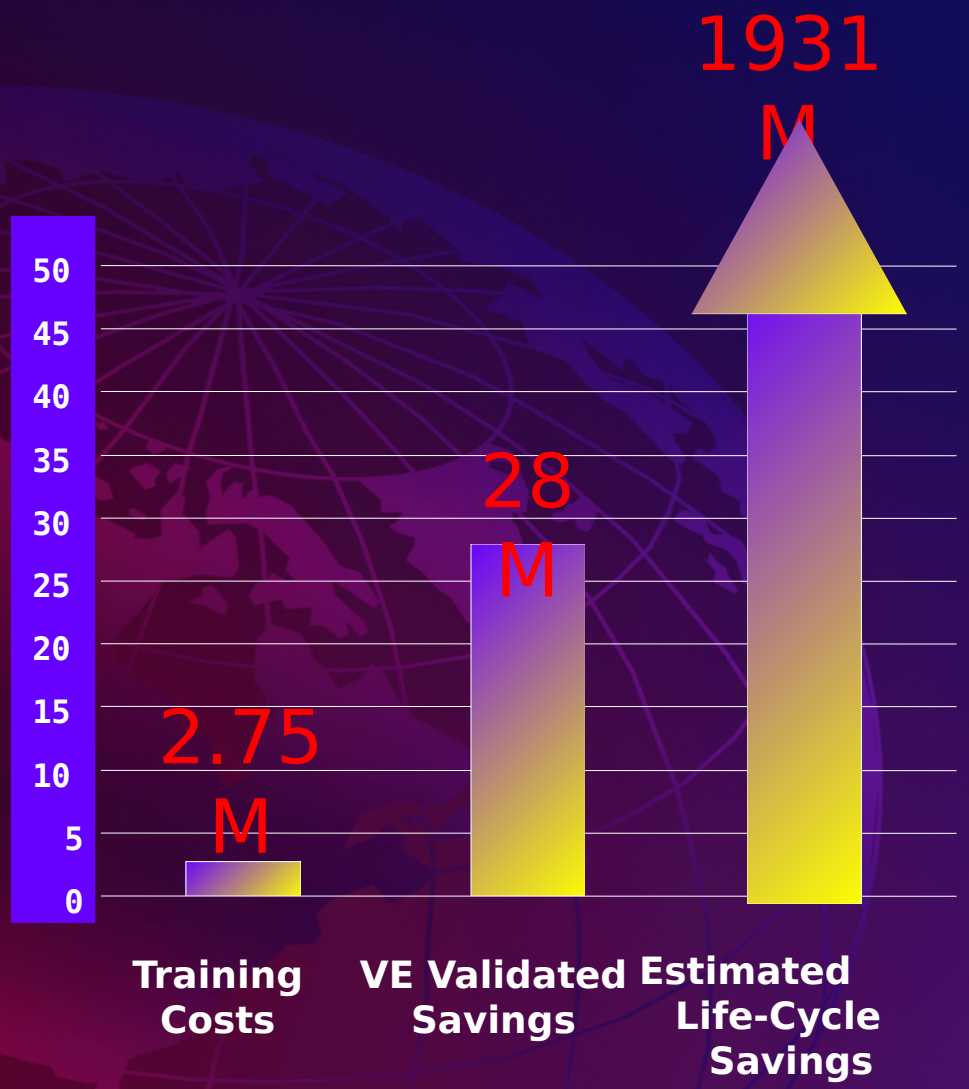
Six Sigma Cost Avoidance and Risk Reduction

Lean Cycle Time Reduction

“Does it Work?”

L/6σ Achievements at Picatinny Arsenal over the last three years:

- **$1.9B Estimated Life Cycle Savings**
- **$28M 10:1 VE Validated Returns**
- **Improvement in All Aspects of Q$SR**
  - ✓ **Q: Quality/Customer Satisfaction (96% of Projects)**
  - ✓ **$: Cost (72% of Projects)**
  - ✓ **S: Schedule (68% of Projects)**
  - ✓ **R: Risk (87% of Projects)**
- **Improvement Projects in:**
  - ✓ **Engineering (41%)**
  - ✓ **Production (31%)**
  - ✓ **Management/Administration (28%)**



Summary

Implementation of a Successful L/6σ Program Requires:

- Management Commitment and Direct Involvement
- The structure and discipline of a training and certification process
- Depth and breath of applications capabilities
- Integration of QMS, VOC, Lean and Six Sigma
- A focus on coordinated and collaborative bottom line metrics (Balanced Scorecard)
- Program implementation Status, Score and Report

Integrated - Structured – Disciplined - Accountable

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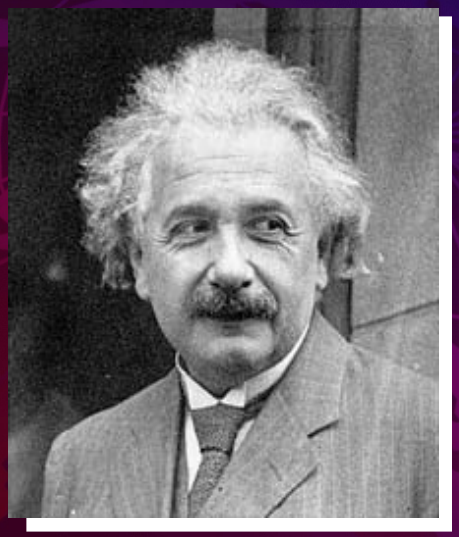
Enterprise Excellence

We cannot solve our problems with the same thinking we used when we created them.



The Army Transformation and implementation of the FCS is dependent upon new technologies, new management skills and new decision making processes.

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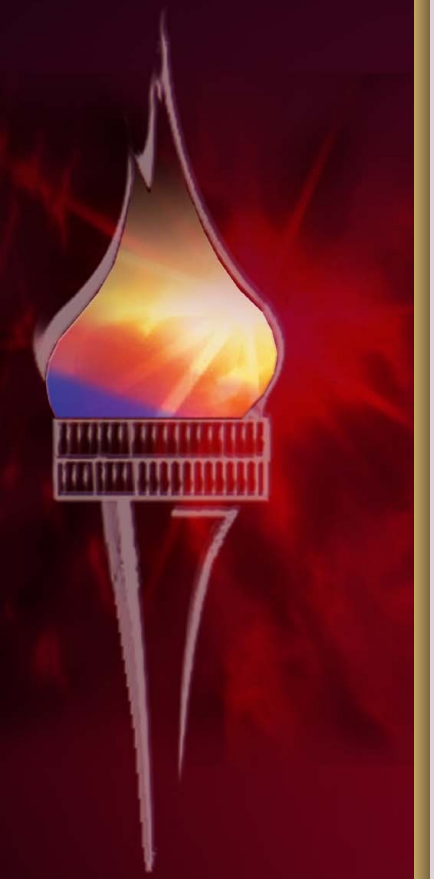

Backup Materiel

L/6σ Implementation Strategy

The L/6σ Enterprise Implementation Strategy consists of the following steps:

1. Enterprise Implementation Assessment
    - Mission
    - Vision
    - Goals/Objectives
    - Scope of the Implementation
    - Level of Implementation
    - Integration with Business Units of the Enterprise
    - Tailoring of Program Implementation and Workshop Materials
2. Enterprise Executive Champion Training
    - Executive Champion Workshop
    - Establish Executive Steering Committee
    - Develop Program/Project Review Requirements
    - Establish Status, Score and Report Metrics and Periods
    - Link to Management Dashboard or Balanced Scorecard
    - Executive Black Belt Workshop (Option)

L/6σ Implementation Strategy

3. Establish Business Unit Implementation Program
   - Executive Champion Training
   - Tailoring of Program Implementation and Workshop Materials
   - Establish Business Unit L/6s Review Panel
   - Executive Black Belt Workshop (Optional)
   - Green Belt Workshops
   - Black Belt Workshops
   - L/6σ Project Selection and Review
   - L/6σ Project Completion and Certification

A single wave of program implementation at the business unit level usually consists of the following:

a. One L/6σ Executive Champion Workshop
b. Three L/6σ Green Belt Workshops
c. One L/6σ Black belt Workshop

Ammunition Enterprise Map

Requirements	Functions	Processes
• Requirements Generation Process - AAO • Requirements Document • Funded Program	**Technology Development**	• S and T • Systems Engineering • Modeling and Simulation • Technology Transfer • Configuration Management
• Requirements Generation Process - AAO • Requirements Document • Funded Program	**Develop Ammunition**	• S and T • Program Management/Planning/Control • Contracting • System Engineering • Test and Evaluation • PPBES • Milestone Review Process

Ammunition Enterprise Map

Requirements | **Functions** | **Processes**

- Funded Program
- Technical Definition
- Milestone C
- Industrial Base Strategy

Acquisition Of Ammunition

- Acquisition Strategy / Planning
- Contracting
- Program Management/Planning/Control
- Review/Certification if TDP if Applicable
- PPBES
- Pre-production Engineering
- Price & Availability
- IM Strategy (legacy systems)
- Industrial Base Management

- Contract

Production Of Ammunition

- Production/Systems Engineering
- Design and Process Improvement
- Production Testing
- Production Monitoring
- Configuration Management
- Acceptance
- Program Management/Planning/Control
- Manufacturing
- Quality Assurance
- First Destination Shipping
- Contract Modification
- Safety and Environmental

Ammunition Enterprise Map

Requirements	Functions	Processes
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Ammunition Enterprise Map

Requirements | **Functions** | **Processes**

- Mgmt Control Plan

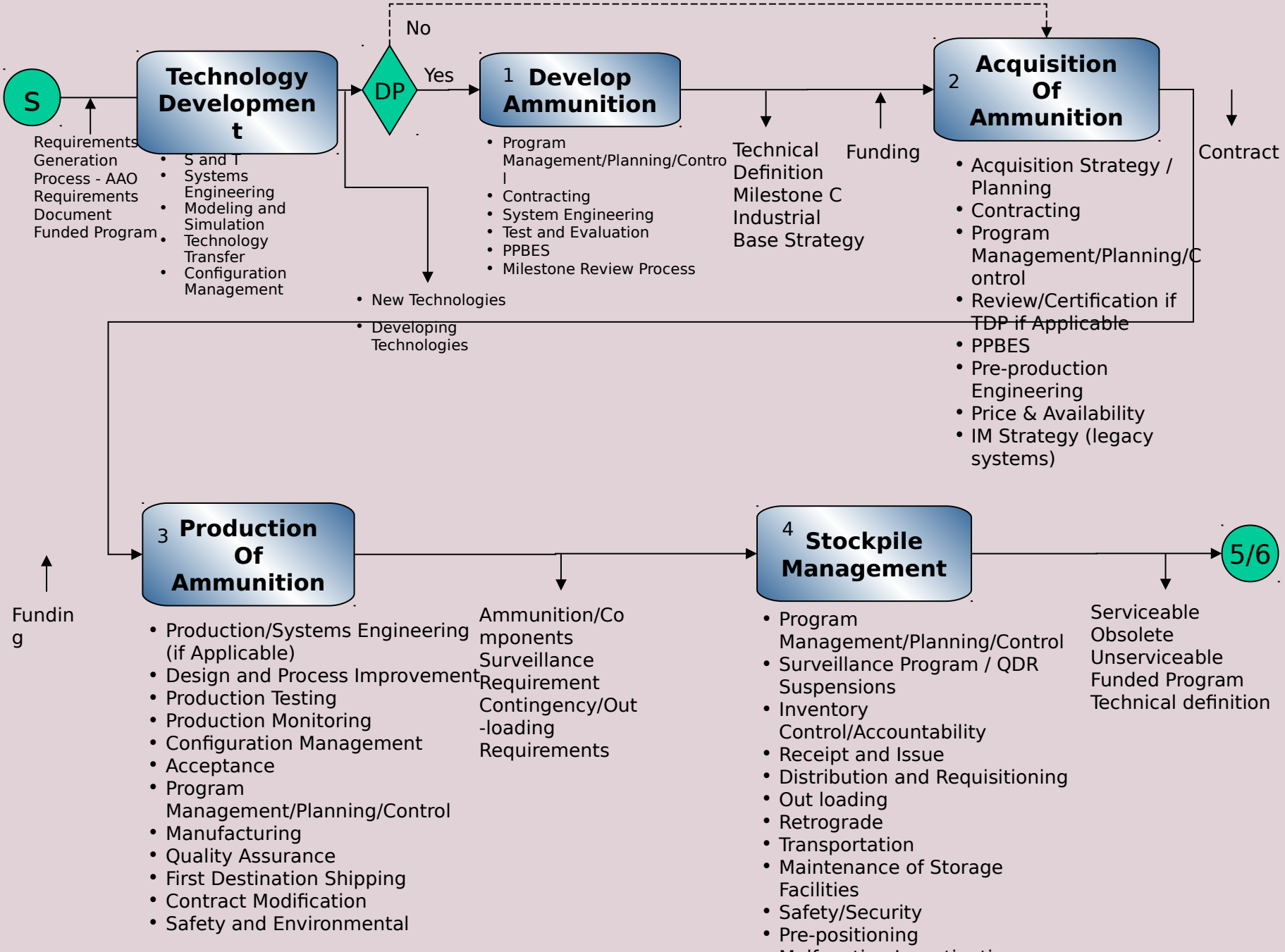
Management

- Program Management/Planning/Control
- Personnel Management
- Physical Security
- TDY
- Management metrics
- Training
- Property Control
- IT
- Financial Management
- Tasker Tracking
- Scheduling
- Program Reviews

- Requirements
- AR700-90
- Government Facilities
- Funding
- Commercial Supply Base

Industrial Base Management

- Program Management/Planning/Control
- Environmental Compliance
- Production Based Support Program
- Section 806
- Industrial Preparedness Planning
- Contracting
- Force Protection
- ARMS
- Industrial Base Strategic Plan
- BRAC Planning
- Production Modernization
- PPBES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Acceptance
Program Management/Planning/Control
Manufacturing
Quality Assurance
First Destination Shipping
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Out loading
Retrograde
Transportation
Maintenance of Storage Facilities
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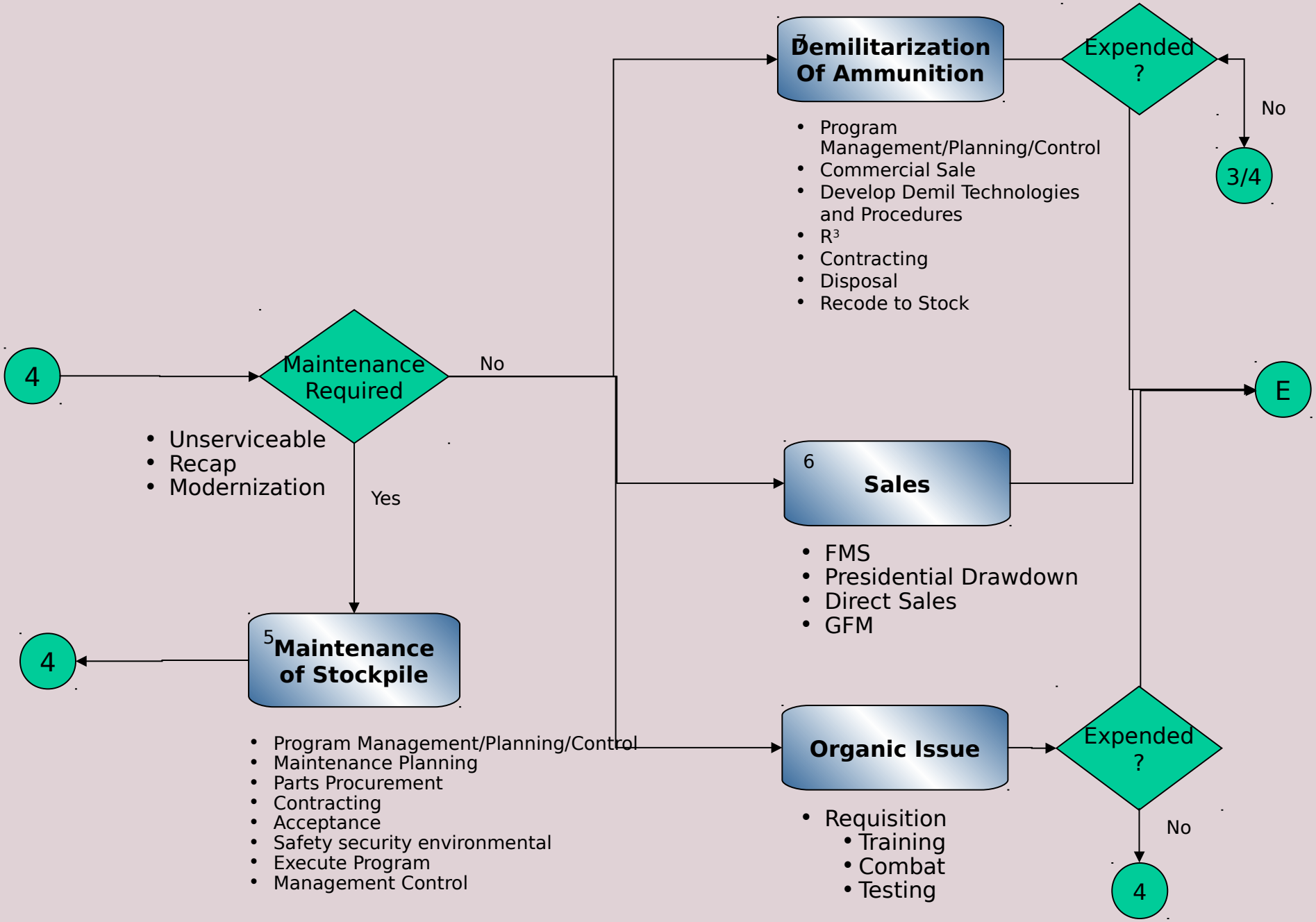
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Maintenance Required
No
Yes
• Unserviceable
• Recap
• Modernization
7 Demilitarization Of Ammunition
• Program Management/Planning/Control
• Commercial Sale
• Develop Demil Technologies and Procedures
• R³
• Contracting
• Disposal
• Recode to Stock
Expended ?
No
3/4
E
6 Sales
• FMS
• Presidential Drawdown
• Direct Sales
• GFM
4
5 Maintenance of Stockpile
• Program Management/Planning/Control
• Maintenance Planning
• Parts Procurement
• Contracting
• Acceptance
• Safety security environmental
• Execute Program
• Management Control
Organic Issue
• Requisition
• Training
• Combat
• Testing
Expended ?
No
4

Ammunition Enterprise Mission

The Ammunition Enterprise is the integration of people, infra-structure and processes required for ammunition life cycle

	Technology Development 0	S and T prioritization Pri 16 -level 1	Develop Ammunition-level 0	System Engineering Pri 14 -level 1	Acquisition of Ammunition-level 0	Acquisition Strategy / Planning -level 1 Pri 1	Procurement -level 2 Pri 3	Production of Ammunition-level 0	Production/Systems Engineering (if Applicable) -level 1 Pri 4	Design and Process Improvement -level 1 Pri 2	Production Monitoring pri 12 -level 2	Control of Manufacturing Process - level 1 Pri 9	Quality Assurance -level 1 Pri 6	Sockpile Management-level 0	Surveillance Program / QDR Suspensions Pro 11 -level 1	Inventory Control/Accountability Pri 17 -level 1	Distribution and Requisitioning Pri 18 -level	Maintenance of Stockpile-level 0	Demilitization of Ammunition-Level 0	Develop Demil Technologies and Procedures Pri 15 -level 1	Management controls-Level 0	Management metrics -level 1 Pri 10	IT -level 1 Pri 7	Industrial Base Management-Level 0	Production Based Support Program -level 1 Pri 13	Industrial Base Strategic Plan -level 1 Pri 8	Production Modernization -level 1 Pri 5
Requirements																											
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On time delivery					▪			▪						▪							▪						
Within cost	▪		▪		▪			▪										▪						▪			
Cost effective	▪		▪		▪			▪						▪													
Safe	▪		▪		▪			▪																			
Reliable	▪		▪		▪			▪						▪				▪	▪								
High Quality	▪		▪		▪			▪						▪				▪									
Continuous Improvement	▪		▪		▪			▪						▪				▪									
Readiness	▪		▪		▪			▪						▪				▪			▪			▪			
Disposal	▪		▪																▪								
Overmatch	▪		▪											▪													
Assignments Within Enterprise																											
PEO-Ammunition	**S**	**S**	**O**	**O**	**O**	**O**		**O**	**O**	**O**		**O**	**O**	**S**	**S**	**S**	**S**	**S**	**O**	**S**	**O**	**PO**	**PO**	**PO**	**O**	**O**	**PO**
PM-CAS	**S**	**S**	**S**	**S**	**S**	**S**	**O**	**S**	**S**	**S**	**O**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
PM-MAS	**S**	**S**	**S**	**S**	**S**	**S**	**O**	**S**	**S**	**S**	**O**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
PM CCS	**S**	**S**	**S**	**S**	**S**	**S**	**O**	**S**	**S**	**S**	**O**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
PM-JS	**S**	**S**	**S**	**S**	**S**	**S**	**O**	**S**	**S**	**S**	**O**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**O**	**S**	**S**	**S**		**S**	**S**	**S**
JMC	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**O**	**O**	**O**	**O**	**O**	**S**	**S**	**O**	**PO**	**PO**	**PO**	**S**	**S**	**PO**
ARDEC	**O**	**O**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**		**S**	**S**	**S**	**O**	**PO**	**PO**	**S**	**S**	**S**	**S**
TACOM							**S**																		**S**		
External to Enterprise																											
DA Staff			**O**		**O**			**S**						**S**				**S**	**S**								
OSD Staff			**O-ACAT**		**O-ACAT 1**			**S**						**S**				**S**	**S**								
EDCA																											
External Support Activities																											

“Does it Work?”

Cultural Change in the Ammunition Enterprise

- **PEO**
- **PEO Staff**
- **Program Managers**
- **Executive Black Belt**
- **L/6σ Green Belt Workshops**
- **L/6σ Black Belt Workshops**
- **Management, Administrative, Design and development, Production, Planning processes**
- **Fully integrated within the organization and with suppliers**

Integrated - Structured – Disciplined - Accountable